SEQUENCE LISTING

<110> ADLER, JON ELLIOT
       ZOZULYA, SERGEY
       LI, XIADONG
       O'CONNELL, SHAWN
       STASZEWSKI, LENA

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Gly Asp Tyr Val Leu Gly Gly Leu Phe Pro Leu Gly Glu Ala Glu Glu
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Ala Gly Leu Arg Ser Arg Thr Arg Pro Ser Ser Pro Val Cys Thr Arg
    50              55              60

Phe Ser Ser Asn Gly Leu Leu Trp Ala Leu Ala Met Lys Met Ala Val
65              70              75              80

Glu Glu Ile Asn Asn Lys Ser Asp Leu Leu Pro Gly Leu Arg Leu Gly
                85              90              95

Tyr Asp Leu Phe Asp Thr Cys Ser Glu Pro Val Val Ala Met Lys Pro
            100             105             110

Ser Leu Met Phe Leu Ala Lys Ala Gly Ser Arg Asp Ile Ala Ala Tyr
        115             120             125

Cys Asn Tyr Thr Gln Tyr Gln Pro Arg Val Leu Ala Val Ile Gly Pro
    130             135             140

His Ser Ser Glu Leu Ala Met Val Thr Gly Lys Phe Phe Ser Phe Phe
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Leu Met Pro His Tyr Gly Ala Ser Met Glu Leu Leu Ser Ala Arg Glu
            165             170             175

Thr Phe Pro Ser Phe Phe Arg Thr Val Pro Ser Asp Arg Val Gln Leu
        180             185             190

Thr Ala Ala Ala Glu Leu Leu Gln Glu Phe Gly Trp Asn Trp Val Ala
    195             200             205

Ala Leu Gly Ser Asp Asp Glu Tyr Gly Arg Gln Gly Leu Ser Ile Phe
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Ser Ala Leu Ala Ala Ala Arg Gly Ile Cys Ile Ala His Glu Gly Leu
225             230             235             240

Val Pro Leu Pro Arg Ala Asp Asp Ser Arg Leu Gly Lys Val Gln Asp
            245             250             255

Val Leu His Gln Val Asn Gln Ser Ser Val Gln Val Val Leu Leu Phe
        260             265             270

Ala Ser Val His Ala Ala His Ala Leu Phe Asn Tyr Ser Ile Ser Ser
    275             280             285

Arg Leu Ser Pro Lys Val Trp Val Ala Ser Glu Ala Trp Leu Thr Ser
290             295             300

Asp Leu Val Met Gly Leu Pro Gly Met Ala Gln Met Gly Thr Val Leu
305             310             315             320
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Lys Thr His Leu Ala Leu Ala Thr Asp Pro Ala Phe Cys Ser Ala Leu
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Gly Glu Arg Glu Gln Gly Leu Glu Glu Asp Val Val Gly Gln Arg Cys
            355             360             365

Pro Gln Cys Asp Cys Ile Thr Leu Gln Asn Val Ser Ala Gly Leu Asn
    370             375             380

His His Gln Thr Phe Ser Val Tyr Ala Ala Val Tyr Ser Val Ala Gln
385             390             395             400

Ala Leu His Asn Thr Leu Gln Cys Asn Ala Ser Gly Cys Pro Ala Gln
            405             410             415

Asp Pro Val Lys Pro Trp Gln Leu Leu Glu Asn Met Tyr Asn Leu Thr
            420             425             430

Phe His Val Gly Gly Leu Pro Leu Arg Phe Asp Ser Ser Gly Asn Val
        435             440             445

Asp Met Glu Tyr Asp Leu Lys Leu Trp Val Trp Gln Gly Ser Val Pro
    450             455             460

Arg Leu His Asp Val Gly Arg Phe Asn Gly Ser Leu Arg Thr Glu Arg
465             470             475             480

Leu Lys Ile Arg Trp His Thr Ser Asp Asn Gln Lys Pro Val Ser Arg
            485             490             495

Cys Ser Arg Gln Cys Gln Glu Gly Gln Val Arg Arg Val Lys Gly Phe
            500             505             510

His Ser Cys Cys Tyr Asp Cys Val Asp Cys Glu Ala Gly Ser Tyr Arg
        515             520             525

Gln Asn Pro Asp Asp Ile Ala Cys Thr Phe Cys Gly Gln Asp Glu Trp
    530             535             540

Ser Pro Glu Arg Ser Thr Arg Cys Phe Arg Arg Arg Ser Arg Phe Leu
545             550             555             560

Ala Trp Gly Glu Pro Ala Val Leu Leu Leu Leu Leu Leu Ser Leu
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Ala Leu Gly Leu Val Leu Ala Ala Leu Gly Leu Phe Val His His Arg
        580             585             590

Asp Ser Pro Leu Val Gln Ala Ser Gly Gly Pro Leu Ala Cys Phe Gly
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Leu Val Cys Leu Gly Leu Val Cys Leu Ser Val Leu Leu Phe Pro Gly
    610             615             620
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Gln Pro Ser Pro Ala Arg Cys Leu Ala Gln Gln Pro Leu Ser His Leu
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Pro Leu Thr Gly Cys Leu Ser Thr Leu Phe Leu Gln Ala Ala Glu Ile
                645             650             655

Phe Val Glu Ser Glu Leu Pro Leu Ser Trp Ala Asp Arg Leu Ser Gly
                660             665             670

Cys Leu Arg Gly Pro Trp Ala Trp Leu Val Val Leu Leu Ala Met Leu
            675             680             685

Val Glu Val Ala Leu Cys Thr Trp Tyr Leu Val Ala Phe Pro Pro Glu
        690             695             700

Val Val Thr Asp Trp His Met Leu Pro Thr Glu Ala Leu Val His Cys
705             710             715             720

Arg Thr Arg Ser Trp Val Ser Phe Gly Leu Ala His Ala Thr Asn Ala
                725             730             735

Thr Leu Ala Phe Leu Cys Phe Leu Gly Thr Phe Leu Val Arg Ser Gln
            740             745             750

Pro Gly Cys Tyr Asn Arg Ala Arg Gly Leu Thr Phe Ala Met Leu Ala
        755             760             765

Tyr Phe Ile Thr Trp Val Ser Phe Val Pro Leu Leu Ala Asn Val Gln
    770             775             780

Val Val Leu Arg Pro Ala Val Gln Met Gly Ala Leu Leu Leu Cys Val
785             790             795             800

Leu Gly Ile Leu Ala Ala Phe His Leu Pro Arg Cys Tyr Leu Leu Met
            805             810             815

Arg Gln Pro Gly Leu Asn Thr Pro Glu Phe Phe Leu Gly Gly Gly Pro
        820             825             830

Gly Asp Ala Gln Gly Gln Asn Asp Gly Asn Thr Gly Asn Gln Gly Lys
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<210> 9
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<212> DNA
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Ala Ser Gly Gly Ser Gln Phe Cys Phe Gly Leu Ile Cys Leu Gly Leu
              35   40   45

Phe Cys Leu Ser Val Leu Leu Phe Pro Gly Arg Pro Ser Ser Ala Ser
        50   55   60

Cys Leu Ala Gln Gln Pro Met Ala His Leu Pro Leu Thr Gly Cys Leu
     65   70   75   80

Ser Thr Leu Phe Leu Gln Ala Ala Glu Thr Phe Val Glu Ser Glu Leu
                  85   90   95

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Pro Leu Ser Trp Ala Asn Trp Leu Cys Ser Tyr Leu Arg Asp Ser Gly
            100                 105             110

Leu Leu Val Val Leu Leu Ala Thr Phe Val Glu Ala Ala Leu Cys Ala
            115             120             125

Trp Tyr Leu Thr Ala Ser Pro Glu Val Val Thr Asp Trp Ser Val Leu
    130             135             140

Pro Thr Glu Val Leu Glu His Cys His Val Arg Ser Trp Val Asn Leu
145             150             155             160

Gly Leu Val His Ile Thr Asn Ala Met Val Ala Phe Leu Cys Phe Leu
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Gly Thr Phe Leu Val Gln Asp Gln
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<211> 558
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Ala Ser Gly Gly Ser Leu Phe Cys Phe Gly Leu Ile Cys Leu Gly Leu
            35              40              45

Phe Cys Leu Ser Val Leu Leu Phe Pro Gly Arg Pro Arg Ser Ala Ser
    50              55              60

Cys Leu Ala Gln Gln Pro Met Ala His Leu Pro Leu Thr Gly Cys Leu
65              70              75              80
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Ser Thr Leu Phe Leu Gln Ala Ala Glu Ile Phe Val Glu Ser Glu Leu
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Pro Leu Ser Trp Ala Asn Trp Leu Cys Ser Tyr Leu Arg Gly Pro Trp
               100   105   110

Ala Trp Leu Val Val Leu Leu Ala Thr Leu Val Glu Ala Ala Leu Cys
        115   120   125

Ala Trp Tyr Leu Met Ala Phe Pro Pro Glu Val Val Thr Asp Trp Gln
        130   135   140

Val Leu Pro Thr Glu Val Leu Glu His Cys Arg Met Arg Ser Trp Val
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Ser Leu Gly Leu Val His Ile Thr Asn Ala Gly Val Ala Phe Leu Cys
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Phe Leu Gly Thr Phe Leu Val Gln Ser Gln
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Ser Leu Lys Ala Glu Leu Asp Leu Glu Glu Arg Val Met Gly Pro Arg
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Cys Ser Gln Cys Asp Tyr Ile Met Leu Gln Asn Leu Ser Ser Gly Leu
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<213> Homo sapiens

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<212> PRT
<213> Homo sapiens

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Cys Cys Trp Ala Phe Ala Cys His Ser Thr Glu Ser Ser Pro Asp Phe
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Thr Leu Pro Gly Asp Tyr Leu Leu Ala Gly Leu Phe Pro Leu His Ser
        35   40   45

Gly Cys Leu Gln Val Arg His Arg Pro Glu Val Thr Leu Cys Asp Arg
    50   55   60

Ser Cys Ser Phe Asn Glu His Gly Tyr His Leu Phe Gln Ala Met Arg
65   70   75   80

Leu Gly Val Glu Glu Ile Asn Asn Ser Thr Ala Leu Leu Pro Asn Ile
            85   90   95

Thr Leu Gly Tyr Gln Leu Tyr Asp Val Cys Ser Asp Ser Ala Asn Val
        100   105   110

Tyr Ala Thr Leu Arg Val Leu Ser Leu Pro Gly Gln His His Ile Glu
    115   120   125

Leu Gln Gly Asp Leu Leu His Tyr Ser Pro Thr Val Leu Ala Val Ile
    130   135   140

Gly Pro Asp Ser Thr Asn Arg Ala Ala Thr Thr Ala Ala Leu Leu Ser
145   150   155   160

Pro Phe Leu Val Pro Met Ile Ser Tyr Ala Ala Ser Ser Glu Thr Leu
            165   170   175

Ser Val Lys Arg Gln Tyr Pro Ser Phe Leu Arg Thr Ile Pro Asn Asp
        180   185   190

Lys Tyr Gln Val Glu Thr Met Val Leu Leu Leu Gln Lys Phe Gly Trp
    195   200   205

Thr Trp Ile Ser Leu Val Gly Ser Ser Asp Asp Tyr Gly Gln Leu Gly
    210   215   220

Val Gln Ala Leu Glu Asn Gln Ala Thr Gly Gln Gly Ile Cys Ile Ala
225   230   235   240

Phe Lys Asp Ile Met Pro Phe Ser Ala Gln Val Gly Asp Glu Arg Met
            245   250   255

Gln Cys Leu Met Arg His Leu Ala Gln Ala Gly Ala Thr Val Val Val
        260   265   270

Val Phe Ser Ser Arg Gln Leu Ala Arg Val Phe Phe Glu Ser Val Val
        275   280   285

Leu Thr Asn Leu Thr Gly Lys Val Trp Val Ala Ser Glu Ala Trp Ala
    290   295   300

Leu Ser Arg His Ile Thr Gly Val Pro Gly Ile Gln Arg Ile Gly Met
305   310   315   320

Val Leu Gly Val Ala Ile Gln Lys Arg Ala Val Pro Gly Leu Lys Ala
            325   330   335

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Phe Glu Glu Ala Tyr Ala Arg Ala Asp Lys Lys Ala Pro Arg Pro Cys
        340         345             350

His Lys Gly Ser Trp Cys Ser Ser Asn Gln Leu Cys Arg Glu Cys Gln
        355         360             365

Ala Phe Met Ala His Thr Met Pro Lys Leu Lys Ala Phe Ser Met Ser
370             375             380

Ser Ala Tyr Asn Ala Tyr Arg Ala Val Tyr Ala Val Ala His Gly Leu
385             390             395             400

His Gln Leu Leu Gly Cys Ala Ser Gly Ala Cys Ser Arg Gly Arg Val
            405             410             415

Tyr Pro Trp Gln Leu Leu Glu Gln Ile His Lys Val His Phe Leu Leu
        420             425             430

His Lys Asp Thr Val Ala Phe Asn Asp Asn Arg Asp Pro Leu Ser Ser
        435             440             445

Tyr Asn Ile Ile Ala Trp Asp Trp Asn Gly Pro Lys Trp Thr Phe Thr
    450             455             460

Val Leu Gly Ser Ser Thr Trp Ser Pro Val Gln Leu Asn Ile Asn Glu
465             470             475             480

Thr Lys Ile Gln Trp His Gly Lys Asp Asn Gln Val Pro Lys Ser Val
            485             490             495

Cys Ser Ser Asp Cys Leu Glu Gly His Gln Arg Val Val Thr Gly Phe
        500             505             510

His His Cys Cys Phe Glu Cys Val Pro Cys Gly Ala Gly Thr Phe Leu
        515             520             525

Asn Lys Ser Asp Leu Tyr Arg Cys Gln Pro Cys Gly Lys Glu Glu Trp
    530             535             540

Ala Pro Glu Gly Ser Gln Thr Cys Phe Pro Arg Thr Val Val Phe Leu
545             550             555             560

Ala Leu Arg Glu His Thr Ser Trp Val Leu Leu Ala Ala Asn Thr Leu
            565             570             575

Leu Leu Leu Leu Leu Leu Gly Thr Ala Gly Leu Phe Ala Trp His Leu
        580             585             590

Asp Thr Pro Val Val Arg Ser Ala Gly Gly Arg Leu Cys Phe Leu Met
        595             600             605

Leu Gly Ser Leu Ala Ala Gly Ser Gly Ser Leu Tyr Gly Phe Phe Gly
    610             615             620

Glu Pro Thr Arg Pro Ala Cys Leu Leu Arg Gln Ala Leu Phe Ala Leu
625             630             635             640
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Gly Phe Thr Ile Phe Leu Ser Cys Leu Thr Val Arg Ser Phe Gln Leu
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Ile Ile Ile Phe Lys Phe Ser Thr Lys Val Pro Thr Phe Tyr His Ala
            660             665             670

Trp Val Gln Asn His Gly Ala Gly Leu Phe Val Met Ile Ser Ser Ala
        675             680             685

Ala Gln Leu Leu Ile Cys Leu Thr Trp Leu Val Val Trp Thr Pro Leu
    690             695             700

Pro Ala Arg Glu Tyr Gln Arg Phe Pro His Leu Val Met Leu Glu Cys
705             710             715                 720

Thr Glu Thr Asn Ser Leu Gly Phe Ile Leu Ala Phe Leu Tyr Asn Gly
            725             730             735

Leu Leu Ser Ile Ser Ala Phe Ala Cys Ser Tyr Leu Gly Lys Asp Leu
            740             745             750

Pro Glu Asn Tyr Asn Glu Ala Lys Cys Val Thr Phe Ser Leu Leu Phe
            755             760             765

Asn Phe Val Ser Trp Ile Ala Phe Phe Thr Thr Ala Ser Val Tyr Asp
    770             775             780

Gly Lys Tyr Leu Pro Ala Ala Asn Met Met Ala Gly Leu Ser Ser Leu
785             790             795             800

Ser Ser Gly Phe Gly Gly Tyr Phe Leu Pro Lys Cys Tyr Val Ile Leu
            805             810             815

Cys Arg Pro Asp Leu Asn Ser Thr Glu His Phe Gln Ala Ser Ile Gln
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Asp Tyr Thr Arg Arg Cys Gly Ser Thr
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<210> 18
<211> 14
<212> PRT
<213> Artificial Sequence

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<220>
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<220>
<221> MOD_RES
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<223> Arg, Gln or Pro

<220>
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<223> Arg or Thr

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<223> Ser, Pro or Val

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<223> Val, Glu, Arg, Lys or Thr

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<223> Ala or Glu

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<223> Trp or Leu

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<210> 19
<211> 15
<212> PRT
<213> Artificial Sequence

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<223> Leu or Gln

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<223> Glu, Gly or Thr
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<211> 3563
<212> DNA
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